DOCUMENT RESUME

ED 414 191 SE 060 973

AUTHOR Helton, Jennifer

TITLE Appropriate Strategies for Improving Math Portfolios: A Comparison of Self-Assessment versus Peer Conferencing. UKERA Occasional Papers.

INSTITUTION Kentucky Univ., Lexington. Inst. on Education Reform.
REPORT NO UKERA-0008
PUB DATE 1994-00-00
NOTE 34p.
AVAILABLE FROM Institute on Education Reform, 101 Taylor Education Building, Lexington, KY 40506-0001; phone: 606-257-6734.
PUB TYPE Reports - Research (143)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Algebra; *Educational Assessment; Grade 8; Interpersonal Communication; Junior High Schools; *Mathematics Education; Peer Teaching; *Portfolio Assessment; *Self Evaluation (Individuals)
IDENTIFIERS *Pre Algebra

ABSTRACT

The purpose of this study was to determine the more appropriate strategy for improving eighth-grade portfolio entries. There was a comparison between two specific types of revising/correcting conferences, self-assessment and peer conferences. Most of the research concerning the writing process focuses on peer conferencing; however, it was speculated that in math, self-assessment may prove to be more appropriate. The reason behind this speculation rests in the fact that students might simply copy each others' solutions and claim it as their own. The study consisted of a total of 52 eighth-grade students enrolled in Pre-Algebra. Each was taught how to use self-assessment and peer conferencing forms with the intention of improving portfolio entries. The study examined a random sample of 32 papers revised and/or corrected using both types of forms. A seven category checklist was prepared and used as a tally sheet to record the actual changes made between first drafts and revised/corrected drafts. The findings of this study showed that a substantially higher percentage of improvements were made to original portfolio entries when students used a peer conference. The findings did not indicate that the students copied from one another nor simply copied another student's solution to an entry. This study supports the recognition of using a writing process approach to enhance written work in the subject of mathematics. It also acknowledges that eighth-grade math students can, in fact, learn from one another. The peer conferences appeared to be more beneficial than the self-assessment technique for students who used the information to improve their portfolio entries. (Author)

UKERA Occasional Papers

Appropriate Strategies for Improving Math Portfolios: A Comparison of Self-Assessment versus Peer Conferencing

UKERA #0008

Institute on Education Reform
University of Kentucky

Appropriate Strategies for Improving Math Portfolios: A Comparison of Self-Assessment versus Peer Conferencing

Jennifer Helton
Classroom Teacher
Kenneth D. King Middle School
Harrodsburg, Kentucky
Graduate Student
University of Kentucky

For additional copies of this paper or for a list of other UKERA Occasional Papers, contact the Institute on Education Reform, 101 Taylor Education Building, Lexington, KY 40506-0001 or phone 606/257-6734.

ABSTRACT

The purpose of this study was to determine the more appropriate strategy for improving eighth-grade portfolio entries. There was a comparison between two specific types of revising/correcting conferences: self-assessment and peer conferences. A lot of the research concerning the writing process focuses on peer conferencing; however, it was speculated that in math, self-assessment may prove to be more appropriate. The reason behind this speculation rests in the fact that students might simply copy each others' solutions and claim it as their own.

The study consisted of a total of fifty-two eighth-grade students enrolled in Pre-Algebra. Each was taught how to use a self-assessment and peer conferencing form with intention of improving portfolio entries. The study examined a random sample of thirty-two papers revised and/or corrected using both types of forms. A seven category checklist was prepared and used as a tally sheet to record the actual changes made between first drafts and revised/corrected drafts.

The findings of this study showed that a substantially higher percentage of improvements were made to original portfolio entries when students used a peer conference. The findings did not indicate that the students copied ideas from one another, nor simply copied another student's solution to an entry.

In summary, this study supports the recognition of using a writing process-approach to enhance written work in the subject of mathematics. It also acknowledges that eighth-grade math students can, in fact, learn from one another. The peer conferences appeared to be more beneficial than the self-assessment technique for students who used the information to improve their portfolio entries.

This study was conducted as a partial fulfillment of the requirements for Education 642, Research and Theory in Teaching Language Arts.

PURPOSE

Learning to use mathematical concepts and skills with mastery takes time. Students must be given ample opportunities to explore and manipulate concepts, and to classify, analyze, and conceptualize how math topics relate to their lives. For these reasons, math assessment must encompass a wide variety of learning styles, facilitate interaction between teacher and student, allow for individual strengths, promote problem-solving and self-confidence, and promote active involvement in learning.

In order for assessment to take place, teachers have to know what their students understand. While paper and pencil tests may provide some physical evidence for the concepts and skills a student has mastered, these assessments provide little or no explanation of the student's depth of understanding, ability to apply strategies in different situations, or personal attitude toward the covered material. These assessments also provide little or no evidence of a student's continued progress in math. Therefore, teachers must use assessment instruments that allow for individual strengths to shine. Assessment must allow students the opportunity to communicate their mathematics progress to themselves and their teachers.

The days of memorizing facts and formulas are no longer necessary in a mathematics classroom. Students need to be given opportunities to improve higher level skills such as problem-solving, critical thinking, and decision making. Students should be encouraged to look at their own work and make changes as they progress and grow mathematically. While skills and concepts cannot be overlooked or abandoned, it is vitally important for students to see the relevance for these skills. Understanding needs time to develop. Simply applying a formula to a contrived question or task does not provide students the opportunity to bridge the gap between instruction and usefulness. Therefore, progressive and continuous evidence of learning needs to be the basis for assessment. To ensure successful application of math, students should be assessed on their thinking, understanding, and process skills. Portfolios would be used to show evidence of students' progress in these areas. Skills and concepts would also be assessed through the portfolios.

The students in my eighth-grade classes kept an assessment portfolio in mathematics as required by state guidelines. Portfolios are intended to help students learn "that their first effort should not be their last, that revision is part of the improvement process, and that they are expected to re-evaluate their work periodically so that the portfolio represents their best work at a particular point in time" (Kentucky Mathematic Portfolio Teacher's Guide, p. i).

Students kept a working classroom portfolio that contained all of their writings, projects, daily work, and tests. Toward the end of the grading period, students selected their best work from the working portfolios and revised the work. This revised work was placed into the assessment portfolio. The ongoing process of rethinking and revising work helped students "see" and "reflect" upon their progress in math. The portfolios provided students an opportunity to express their understanding of various math topics. Students were encouraged to look at their work and make changes as they progressed and grew mathematically.

In order to improve their portfolio entries, we used the writing process-approach. Therefore, the purpose of the study took into account one aspect of the writing process, the revision aspect. I wanted to determine whether self-assessment or peer conferences resulted in more revising/correcting strategies. It was important for students to understand the "distinction between revising, which involves moving around words and sentences and adjusting content, and correcting, which centers on usage and mechanics" (Judy, p. 92).

Since all students were given the same portfolio tasks, I was concerned that they would "copy" each other's ideas to improve their entries. Although they were aware of the fact that they had to justify any solution and explain how it worked, I was interested in seeing if all the entries looked similar.

RESEARCH QUESTIONS

1. Do students make more revisions/corrections to their portfolio entries when they use a self-assessment technique or a peer editing conference?

2. Which technique produces evidence of more solutions and multiple strategies, clarifies the writing and connection within mathematics, incorporates more mathematical terminology, and identifies more grammatical and/or spelling errors?

REVIEW OF LITERATURE

"A portfolio is a purposeful collection of student work that exhibits the student's efforts, progress, and achievements..." (Paulson, p. 60). In the mathematics portfolio, students should be able to convey how they solved specific problems and relate that information to real-world situations. While the content of a paper for this portfolio would focus on mathematical skills and application, the writing process is needed to improve the students' work.

The need for authors to improve their writing has led to the importance of using a process-approach. On a very basic level, the process-approach encompasses pre-writing, drafting, revising, and publishing. Students can use this approach regardless of the topic or content of their papers (Calkins, 1986; DeGroff, 1987). My research questions focused primarily on the revising stage of the writing-process. Therefore, I examined the effects of two specific types of editing conferences, peer and self editing.

Calkins (1986) stated that the most important aspects of a peer editing conference are being good listeners and making honest reactions to papers. "It is the listener who learns about the subject in these conferences, not the writer" (Calkins, p. 139). If the listener is confused at the end of the paper, then editing and revision should be discussed. When students edit their papers with a peer they are more likely to develop an internalized sense of audience. This, in turn, helps them when they are writing on their own.

One-on-one conferences give students an opportunity to discuss the strengths and weaknesses of the paper. Research has also suggested that "the writing conference provides a particularly effective setting for the development of a student's ability to reflect critically on his or her own work, its content, and the cognitive processes involved in producing the writing" (Walker, p. 267).

Peer conferencing has many benefits in the writing process. The following are listed by Crowhurst (1979, pp. 761-762):

1. Increased motivation to write;
2. Writing for a real audience;
3. A large amount of feedback;
4. Learning from one another's papers.

It was the last benefit listed that caused me some concern. While there were worthwhile arguments for using peer conferencing in process writing, I was concerned that those same arguments would be problems for writing mathematics portfolio entries.

The other type of editing conference the students used was self-assessing. Self-assessment gives a writer the chance to go back, reread what he or she has written, and clarify any points. "Revising is the process of making changes in the text and in one's thinking about it" (Mason, p. 242). Reflection and clarification are the major strengths of self-editing.

Calkins (1986) warned that in order for writers to actually revise their work, they must understand what is meant by revision. She listed several ideas that might help students see what revision entails. The following abbreviated list can be applied to editing mathematical writings.

1. Rework a confused section;
2. Select a functional purpose for the piece and make sure it accomplishes that task;
3. Predict readers' questions, then revise in order to be sure they are answered;
4. Read the draft over, listening to how it sounds;
5. Put the draft aside and return to it another day;
6. Talk with someone about the topic, then rewrite the draft without looking back at the previous versions.

If students actually edit their work, self-assessing can empower them to take charge of their own learning and to assume ownership (Paulson, 1991). Students can also see proof of their own learning and growth when self-editing.

METHODS

Subjects

Eighth-grade students from a rural middle school participated in this study. Data were collected during October and November. There were twenty-five students in one class and twenty-seven students in another. The students all worked on the same set of portfolio tasks. All fifty-two students participated in a combination of self-assessment and peer editing conferences. The following schedule was used:

Students	Type of Conference			
Class 1	Peer	Self	Peer	Self
Class 2	Self	Peer	Self	Peer

The preceding schedule was particularly important for this study because it allowed the students to use both types of conferences simultaneously. Thus, the students' improvements would be the determining factor that influenced the data, not the type of conference. If one type of conference was used for the first two entries and the other type used for the next two entries, then it could be argued that students naturally did better with the second type because they were still using techniques learned from the first type. However, the effects of using one type of conference for an extended amount of time and then using the other type would not influence this study because both conferences would be used on a rotating basis.

Procedures

All fifty-two subjects participated as writers, self-evaluators, and peer evaluators. Students were given two class periods in which to do their pre-writing and first drafts. After that, eight first draft papers, (four from each class), were randomly selected and photocopied.

One or two days after the writing of the first drafts, students participated in a revision/ correction conference. A two page self-assessment form (See Appendix 1) was used for individual editing. To prepare the students for using the self-assessment form the following procedure was followed:

1. Students were given copies of the self-assessment guide.
2. Students were given copies of a proficient portfolio entry taken from the 1992-1993 Benchmark Portfolios. The entry was entitled "How Many Rectangles" (See Appendix 1a).
3. The whole class read the portfolio entry.
4. After reading the entry, there was a whole class discussion on how to assess the entry based on the self-assessment form. Each individual scoring feature and subcategory was discussed. For example, under the first scoring feature of problem solving students had to give specific examples found in the portfolio entry that showed that the writer did understand the problem, did use multiple strategies in solving the problem, did solve the problem, did review, revise, or extend the problem, and did show and explain all work/thinking.
5. Students also discussed how the portfolio entry could have been strengthened based on the subcategories on the self-assessment form.

A ten question checklist (See Appendix 2) was used for the peer conferences. Students were informed that they would be randomly assigned partners for the peer editing conferences. To prepare the students for using the peer conference checklist the following procedure was followed:

1. Students were given copies of the peer conference checklist.
2. Students were given copies of a proficient portfolio entry taken from the 1992-1993 Benchmark Portfolios entitled "Environment Park" (See Appendix 2a).
3. The whole class read the portfolio entry.
4. Students worked in pairs and found specific examples in the entry to answer the ten questions on the peer conference checklist. After the pair reading and discussion there was a whole class discussion on how to assess the entry based on the checklist.

Students were informed that they would be using both types of forms to revise and correct their own portfolio entries. They would be expected to write down the answers to the

peer checklist as well as discuss what was written. It was explained that both forms were intended to help them improve their entries as much as possible. They would be expected to take the conference forms and make any changes outside of class.

After the students edited their papers, the revised versions of the eight papers originally selected were photocopied. The process of photocopying the first and revised drafts was repeated four times. Each time, the selection of first draft papers was random.

In order to determine which type conference produced the most revision/correction changes, the first drafts and edited drafts were compared. A tally sheet (See Appendix 3) was used to record each type of change made.

DATA ANALYSIS

All first drafts, conferencing forms, and edited drafts were analyzed by the researcher. The sample of papers that was revised and/or corrected using one of the conferencing forms was read to determine what revisions and/or corrections were made. In order to determine the frequency of the types of changes, each category on the tally sheet was given a one (1) point value. If there was evidence of a specific category in the revised papers, one (1) point was recorded. If there was no evidence of a specific category, zero (0) points were recorded. Percentages were created by dividing the total number of changes made divided by the total number of possible points in each category.

RESULTS

Table 1 shows the number of percentages of change that resulted from the self-assessment forms and the peer conferencing checklist. When using the self-assessment forms the data indicate that students were able to clarify their solutions/thinking with a high percentage. There were two categories in which the students produced low percentages of change. Of the samples taken, only two of the sixteen papers corrected grammatical and/or spelling errors. The comparison between the first drafts and the edited drafts showed no new indication of how the task related to other subjects and/or everyday life.

When using the peer conferencing checklist, data indicated that students showed evidence of using multiple strategies and were able to clarify their solutions/thinking with an extremely high percentage. There was also evidence to support the fact that students produced more solutions after using the peer checklist. There were two categories in which the students produced little or no change. Only two of the sixteen papers examined related the task to other subjects and/or everyday life. Of the samples taken, no student made any new connections to other mathematical topics that were not already in the first draft papers.

DISCUSSION

The purpose of this study was to determine the influence of two specific revising/ correcting conferences on students writing for their Mathematics Portfolio. The results suggest that peer conferencing resulted in a higher percentage of revisions/corrections in six of the seven categories. Two of the categories on the peer conferencing form showed that 100% of the students used multiple strategies and made clarifications of their solutions/ thinking in the revised papers. In comparison, the sample taken showed that 50% and 88% of the students made the same types of revisions/corrections when using the self-assessment form. The sample taken was small, therefore, I do not contend that 100% of all students would make these same types of changes when using the peer conferencing forms. However, the data do tend to indicate that at least a higher percentage would probably exist even with a larger sample. This is backed by the other data as well, since all but one of the percentages were higher on the peer conferencing forms (See Table 1).

Table 1.
Number and Percentages of Change Based on Revised/Corrected Papers

Categories	Self-assessment		Peer conferences	
	Number	Percentage	Number	Percentage
Evidence of more solutions	6/16	38	14/16	88
Evidence of multiple strategies	8/16	50	16/16	100
Clarification of solutions/thinking	14/16	88	16/16	100
Used more mathematical terms	8/16	50	8/16	50
Related task to other subjects and /or everyday life	0/16	0	2/16	13
Clarified connection within math	4/16	25	0/16	0
Corrected grammatical and/or spelling errors	2/16	13	10/16	63

* *The data are compiled from the 16 papers chosen randomly from the self-assessment forms and the 16 papers chosen randomly from the peer conferences.*

It was hypothesized that the peer conferences would produce very similar revised drafts, since the students were all working on the same set of tasks. The study showed that only 38% of the students provided evidence of more solutions when self-assessing, while 88% of the peer conferences produced more solutions. However, no evidence was found that the students just copied the different solutions. Some students took the advice of their partner and made changes that actually improved their original drafts, while others simply ignored the comments and literally recopied their first drafts. The degree to which the partners commented on the entries read did appear to influence the changes made. For example, the more suggestions or questions posed by the reviewer, the more likely the writer was to make some changes.

The study may have had a built in strategy to keep the students from copying one another's tasks. The students were given the opportunity to choose any task for the peer conference, and I tend to believe that they took their overall best task to the conferences. It became apparent while conducting the study that each of the partners chose a different task. As a matter-of-fact, some students chose to conference about tasks that their partner either had not started working on or had not completed. Therefore, it was virtually impossible for the students to copy solutions or even ideas from one another. That is not to say that when they actually work on a task that they will not borrow ideas from what they have seen in other

portfolio entries. However, in my opinion that would not necessarily be copying; it would be learning from experience. If someone has learned an idea or concept well enough to explain it in his or her own words and apply it to the situation at hand, then learning has taken place.

One area of concern was found in the category of relating the task to other subjects or to everyday life. There were some instances in which no relationship was drawn between the task and its relevance. However, this was not the situation for the majority of the papers. What did become apparent from the study was that once the students found an avenue to link the task and real life situations, they did not expand upon it. Only two papers out of the thirty-two added more relevance in the revised versions than in the original drafts. Furthermore, the majority of the original drafts only contained one example of how the task could relate to other subjects and/or everyday life.

In summary, this study supports the recognition of using a writing process-approach to enhance written work in the subject of mathematics. It also acknowledges that eighth-grade math students can, in fact, learn from one another. The peer conferences appeared to be more beneficial than the self-assessment technique for students who used the information to improve their portfolio entries.

REFERENCES

Calkins, L. M. (1986). The Art of Teaching Writing. Portsmouth, NH: Heinemann Educational Books, Inc.

Crowhurst, M. (1979). The writing workshop: an experiment in peer response to writing. Language Arts, 56, 757-762.

DeGroff, L. (1987). The influence of prior knowledge on writing, conferencing, and revising. The Elementary School Journal, 88, 105-118.

Judy, S., & Judy, S. (1981). An Introduction to the Teaching of Writing. New York: John Wiley & Sons.

KIRIS Mathematics Assessment Portfolio Teacher's Guide

Mason, J., & Au, K. (1986). Reading Instruction for Today. Glenview, IL: Scott, Foresman and Company.

Paulson, F., Paulson, P., & Meyer, C. (1991). What makes a portfolio a portfolio? Educational Leadership, 48, 60-63.

Walker, C., & Elias, D. (1987). Writing conference talk: Factors associated with high- and low-rated writing conferences. Research in the Teaching of English, 21, 266-283.

APPENDIX 1

Mathematics Self-Assessment/ Conference Form

Student: _____

Entry Title: _____

Conference with Classmate _____ Date

Conference with Teacher _____ Date

Conference with Parent/Guardian _____ Date

Scoring Features	Did I	Strength	Need	Comments about strengths and needs
Problem Solving	1. understand the problem 2. use multiple strategies in solving the problem 3. solve the problem 4. review, revise, or extend the problem 5. show and explain all work/thinking			
Reasoning	6. make mathematical conjectures (predictions) through observing data or recognizing patterns 7. test the conjectures using logical evidence (arguments), knowledge, and experiences; or by collecting data 8. explain and justify solution/thinking			
Mathematical Communication	9. use mathematical words, symbols, pictures, graphs, manipulatives, etc. to communicate ideas and thinking 10. communicate concepts, ideas, and reflections through written, oral, or other means			
Integration/ Connections	11. recognize and use mathematics in other subjects and in everyday life 12. use a variety of math concepts/topics and strategies to investigate and solve problems 13. recognize connections/relationships within mathematics			

Scoring Feature	With teacher guidance	Comments
Types	**14. Circle the kind(s) of entry this is.** [writing] [investigation/discovery] [application] [interdisciplinary] [non-routine problem] [project]	
Core Concepts & Principles	**15. Circle the mathematical concepts that were involved in this entry.** [mathematical procedures] [measurement] [space & dimensionality] [number] [mathematical structure] [change] [data]	
Tools	**16. Circle the mathematical tools used in this entry.** [base-10 blocks] [calculator] [beans] [algebra tiles] [computer] [scales] [fraction bars] [compass] [rulers] [decimal squares] [geoboards] [pattern blocks] [protractors] other _____	
Product	**17. Circle the kind of product.** [individual] [group]	

Do you want to revise, edit and/or polish this entry? [YES] [NO]

Possible Changes _____

Is this entry one you want to publish in your assessment portfolio?

[YES] [NO]

APPENDIX 1A

November 23, 1992
Entry # 2

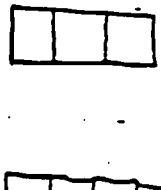
How Many Rectangles?

The questions posed to me had to do with blocks of one square unit. How many rectangles can be made using 1 square unit, 2 square units...; up to 14 square units? With 16 square units? With 24 square units? Are there any patterns? Which numbers will have an odd number of rectangles possible? Which numbers will have exactly two rectangles possible?

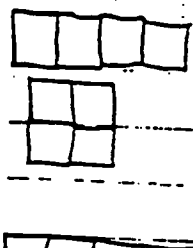
To find the answers to these questions I started out by drawing pictures.

With 1 square unit 1 rectangle is possible
Dimensions = 1 x 1 Area - 1 sq. unit Perimeter - 4

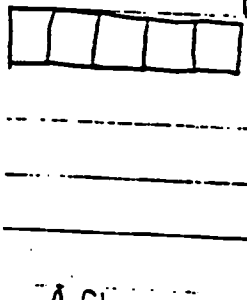
With 2 square units 2 rectangles are possible
Dimensions = 1x2, 2x1 Area - 2 sq. units Perimeter - 6



With 3 square units 2 rectangles are possible
Dimensions = 1x3, 3x1 Area - 3 sq. units Perimeter - 8



With 4 square units 3 rectangles are possible
Dimensions - 1x4, 4x1, 2x2, Area - 4
Perimeter - 10, 8



With 5 square units 2 rectangles are possible
Dimensions - 1x5, 5x1 Area - 12

After drawing these pictures I realized that there were several patterns and could

continue without drawing any more pictures. Here is a chart with my findings:

# of Sq. Units	Dimensions	Area	# of rectangles	Perimeter
6	3x2, 2x3 1x6, 6x1	6	4	14, 14 10, 10
7	1x7, 7x1	7	2	16, 16
8	1x8, 8x1 2x4, 4x2	8	4	18, 18 12, 12
9	1x9, 9x1 3x3	9	3	20, 20 12
10	1x10, 10x1 2x5, 5x2	10	4	22, 22 14, 14
11	1x11, 11x1	11	2	24, 24
12	1x12, 12x1, 2x6 6x2, 3x4, 4x3	12	6	26, 26, 16, 16 14, 14
13	1x13, 13x1	13	2	28, 28
14	1x14, 14x1 2x7, 7x2	14	4	30, 30 18, 18
16	1x16, 16x1, 2x8 8x2, 4x4	16	5	34, 34, 20 20, 16
24	1x24, 24x1, 2x12, 12x2 3x8, 8x3, 4x6, 6x4	24	8	50, 50, 28, 28 22, 22, 20, 20

What I discovered with this problem was several patterns. The first was that the area of each rectangle will always be the same as the number of square units you

are using. The next was, the number of rectangles you can make is the same as the number of factors that the number has. The numbers that will have an odd number of rectangles are numbers with an odd number of factors. The numbers that will have exactly two rectangles possible are prime numbers with only two factors - 1 and the number.

What I learned from this problem was that you don't have to always work a problem all the way out; you can find patterns to help you.

APPENDIX 2

Checklist For Peer Conferences

1. What are the strengths of this entry?

2. What is one weakness of this entry?

3. Does it appear that the writer understands the task that was presented? How do you know?

4. Does the writer explain all of his or her work and thinking? If yes, give an example. If no, where might more explanation be added?

5. Are the solutions explained so that you can understand what the writer is thinking?

6. Did the writer use mathematical words, symbols, pictures, graphs, etc. to communicate ideas and thinking? Examples?

7. Did the writer make any references to how this task applies to real world situations? Examples?

8. Does this entry have a complete cover page?

   Title
   Student's name
   Date
   Task
   Entry #
   Tools and/or manipulatives

9. Did you learn anything new from reading this entry? If so what?

10. Do you have any suggestions for the writer?

APPENDIX 2A

March 3, 1993
Entry # 3

Environmental Park

My group was given the task to create an environmental park that is safe, cost-effective, can be used by people of all ages, and during all seasons, and pleasing to the eyes. We were given $5000, a 300 ft by 200 ft lot, and the following natural features: a stream, an outcropping of rocks, a hill, and five trees.

We set about this project by first deciding where to put the natural features in our park. After that we picked materials and equipment that would be enjoyable and useful. The exact placement and use of the materials purchased, as well as a list of them, is included in our letter to the city commission, the map of our park, and the material cost sheet.

After the plan was drawn we talked about what job would be done by each person. The jobs were finalizing the final park plan, typing the letter, writing the letter, photographing

the plan, and copying the letter. Finally, we decided on how to present our project to the class.

In conclusion, I feel that each group member worked hard and did their fair share and the product is a well done and planned project.

COST OF MATERIALS AND EQUIPMENT

	Cost	Unit	Quantity	Total Cost
Rope	$1	per 10'		
Bricks	$1	each		
Sand	$1	cubic foot	145	$145
Stepping stones	$5	each		
Plants and shrubs	$10	each	32	$320
Trash barrels	$10	each	5	$50
Benches (6' long)	$15	each	4	$60
Old telephone poles (10' long)	$25	each		
Wire fencing (6' high)	$30	per 10 running feet		
Asphalt pavement (4' wide)	$40	per 10 running feet		
Picnic tables with two benches	$50	each	5	$250
Community garden plot and seedlings	$50	10' × 10'		
Animals Small Large	$20 $100	each each	2 (large)	$200
Drinking fountains	$75	each	3	$225
Pond	$100	each	1	$100
Playground equipment	$100	per item	4	$400
Bike racks	$150	each	1	$150
Barbeques	$150	each		
Street lights	$250	each	7	$1750
Public telescope	$300	each		
Stage (20' square)	$300	each		
Bathrooms (one each, men and women)	$350	pair	1	$350
Bleachers (grandstand)	$750	each		
Bridge	$1000	each	1	$1000
Other (list)	$			
	$			

TOTAL COST: $ $5000

Dear City Commission,

A committee of schoolmates was formed to turn a vacant lot into a environmental park. We were given a $5000 limit on the funding.

The following were taken into consideration when developing this plan:

Is the park suitable for people of all ages?

Can the park be used in all seasons and at night as well as day?

Is there a wide variety of activities available within the park?

How safe is the design?

Are there any possible hazards?

Is the design pleasing and enjoyable?

Was the money well spent?

Is energy used efficiently?

Is the design innovative or unusual?

Are the materials used in new and interesting ways?

The park is 300 feet long and 200 feet wide. The rest rooms are placed near the center of the park next to the hill so it can be reached easily from anywhere in the park. Two of the picnic tables are placed next to the playground so the parents can sit close by and see that their children are safe. One is by the stream and one is by the pond so people can eat while viewing the pond and feed the swans of the park. Another is shaded by a large tree. A street lamp is next to each table so people can eat at night. Trash cans are by each entrance, the playground, the rest room, and the pond; places we believe the most trash will develop. There are benches scattered throughout the park for the young and the old. We have a pond in the middle of the stream and bought swans to live there. A pond and animals makes a relaxing place for all who come to the park. Sand and a volleyball net is next to the pond for an exciting thing to do during all seasons. Also, the pond is a prime ice skating location during the winter. The bike rack is next to the entrance for easy parking of bicycles.

There is an outcropping of rocks where they will be the most useful and pleasing to see. The hill, in the center, is the main focal point and can be used for safe sledding in winter months. The trees are placed strategically for shade. Since the pond is part of the stream, it will naturally refill itself if it ever runs dry.

All the criteria has been considered and we feel that our plan has well used our money and space which we were provided with. It also covers all the considered questions we asked ourselves.

Sincerely,

Students

APPENDIX 3

TALLY SHEET

Evidence of editing actually performed on first drafts

	Class 1		Class 2	
	Peer	Self	Peer	Self
Evidence of more solutions				
Evidence of multiple strategies (graphs, table, pictures, etc.)				
Clarification of solutions/ thinking				
Used more mathematical terms				
Related task to other subjects and/or everyday life				
Clarified connections within mathematics				
Corrected grammatical and/or spelling errors				

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement (OERI)
Educational Resources Information Center (ERIC)

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: Appropriate Strategies for Improving Math Portfolios: A Comparison of Self-Assessment versus Peer Conferencing	
Author(s): Jennifer Hetton Miller	
Corporate Source: University of Kentucky Institute on Education Reform	Publication Date: 1994

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic/optical media, and sold through the ERIC Document Reproduction Service (EDRS) or other ERIC vendors. Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce the identified document, please CHECK ONE of the following options and sign the release below.

☑ Sample sticker to be affixed to document — Sample sticker to be affixed to document ☐

Check here
Permitting microfiche (4" x 6" film), paper copy, electronic, and optical media reproduction

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Sample
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Level 1

"PERMISSION TO REPRODUCE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY
Sample
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Level 2

or here
Permitting reproduction in other than paper copy.

Sign Here, Please

Documents will be processed as indicated provided reproduction quality permits. If permission to reproduce is granted, but neither box is checked, documents will be processed at Level 1.

"I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce this document as indicated above. Reproduction from the ERIC microfiche or electronic/optical media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries."

Signature: Jennifer R. Miller	Position: 8th grade teacher
Printed Name: Jennifer R. Miller	Organization: KMS
Address: 395 Cummins Ferry Rd Salvisa KY 40372	Telephone Number: (606) 865-4224
	Date: 6/19/97

OVER

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, *or*, if you wish ERIC to cite the availability of this document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents which cannot be made available through EDRS).

Publisher/Distributor:	
Address:	
Price Per Copy:	Quantity Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant reproduction release is held by someone other than the addressee, please provide the appropriate name and address.

Name and address of current copyright/reproduction rights holder:

Name:

Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:

Acquisitions Department
ERIC Clearinghouse on Educational Management
5207 University of Oregon
1787 Agate Street -- Room 106
Eugene, OR 97403-5207

If you are making an unsolicited contribution to ERIC, you may return this form (and the document being contributed) to:

ERIC Facility
1301 Piccard Drive, Suite 300
Rockville, Maryland 20850-4305
Telephone: (301) 258-5500